MAY 9 1932

SCIENCE NEWS LETTER

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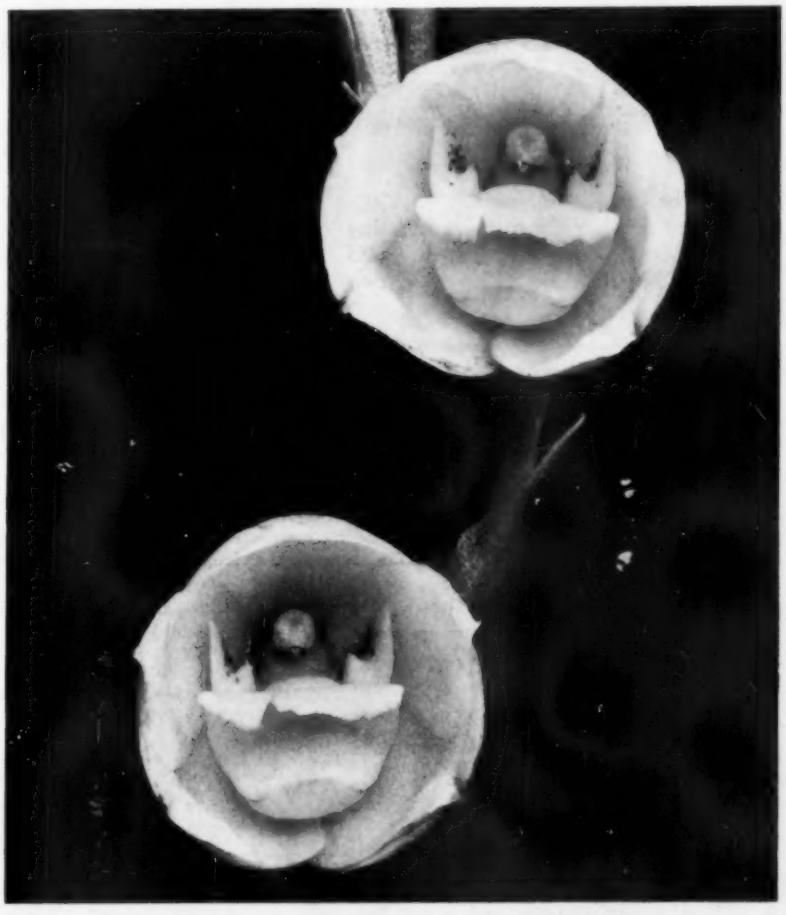
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MAY 14, 1932

In the Form of a Dove

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SCIENCE NEWS LETTER

VOL. XXI *No. 579*

The Weekly Summary of Current Science

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SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

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? DO YOU KNOW THAT ?

It has been suggested that legal battles over wills would be fewer if wills were recorded in the form of talking movies, with the testator reading the bequests and witnesses standing by.

A method of pre-shrinking fabrics, so that they do not shrink in laundering, is one of the newer developments in the textile industry.

More than 3,000 varieties of soy beans were gathered by a Government plant explorer in the Far East, in order to find kinds suitable to the United States.

The homicide death rate in this country has risen from 5.01 per 100,000 population in 1900, to 10.8 in 1931, says Dr. Frederick Hoffman, statistician.

Scientists at the University of California are seeking a serum to fight the virus disease which has killed 6,000 horses and mules in California in two years.

The useful discovery of a process for making rubber stick to metal was an accidental "byproduct," when chemists who were trying to use a new thermoplastic material for hard molded articles were repeatedly handicapped by the material sticking to metal when hot.

A Swedish metallurgist has produced a new aluminum alloy called chromal, which contains chromium, manganese, and nickel, and which is expected to be useful in airplane construction.

China is one of the few great countries where airplanes have come into use for commercial transportation before adequate railway systems were developed.

Grapefruit from Palestine are coming into the German market.

New, nameless waterfalls are appearing almost daily in Yosemite National Park, caused by the melting in the higher country of the heaviest snowcover in sixteen years.

WITH THE SCIENCES THIS WEEK

CURIOSITY-AROUSING questions are prepared concerning the most interesting and important news in each issue. These questions should be a mental stimulant for the adult reader and a boon to the teacher who uses the Science News Letter to add zest to her classroom instruction.

Book reference in italic type is not the source of information of the article, but a reference for further reading on the subject of the article. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ANTHROPOLOGY

What step was taken by the successor of the Neanderthal men? p. 313. *Source Book in Anthropology—A. L. Kroeber and T. T. Waterman—Harcourt, Brace, Rev'd. ed.*, 1931, $3.75.

ARCHAEOLOGY

What is the setting of the newly-discovered Mayan throne? p. 308. *The History of the Maya—Thomas Gunn and J. Eric Thompson—Scribner's*, 1931, $2.50.

AVIATION

What eliminated carbon monoxide from passenger compartments of Navy planes? p. 304

BACTERIOLOGY

In what way do typhus and spotted fever germs grow differently? p. 308

What are the advantages of vaccines made with exploded bacteria? p. 304

ENTOMOLOGY

Where will the grasshopper outbreak be most serious this summer? p. 311. *The Insect Menace—L. O. Howard—Century*, 1931, $3.50.

ICHTHYOLOGY

Who is the king of freshwater fishes and why? p. 315

MEDICINE

During hay fever, as described by Bostock, at what high rate does the pulse sometimes beat? p. 310

What are the two theories regarding the life of the fungus which causes a disease of the tongue? p. 308

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How much will the ocean level be raised by the melting of the great ice caps? p. 311

PALEONTOLOGY

How large was the Diplovertebron? p. 303

What does an aardvark look like? p. 309

PHYSICS

What may the cosmic radiation be considered like? p. 308

In the bombardment of lithium, how often is power liberated? p. 303. *The Romance of the Atom—Benjamin Harrow—Boni & Liveright*, 1927, $1.50

PHYSIOLOGY

By what means can doctors measure blood flow without opening a vein? p. 312

PLANT PHYSIOLOGY

What gases are present in the inner atmosphere of a tree and in what proportions? p. 309

PSYCHIATRY-VITAL STATISTICS

Of a thousand baby boys born idiots, how many will be living at ten years? p. 315

SCIENTIFIC AWARD

Who is David White and what is he noted for? p. 313

SEISMOLOGY

How much slippage in the earth's crust may cause an earthquake? p. 306

What are the possible uses of the baby seismograph? p. 305

ZOOLOGY

Why was the pronghorn antelope safe from the dogs? p. 314

PHYSICS

New Kind of Atom Smashing Liberates Millions of Volts

Experimenters Bombard Lithium, a Metal, Which Combines With Hydrogen and by Disintegration Forms Helium

By DR. VICTOR COFMAN
Science Service Correspondent

A NEW TYPE of atomic disintegration that liberates millions of volts of internal atomic energy is disclosed by experiments by Drs. J. D. Cockroft and E. T. S. Walton working in the Cavendish Laboratory, Cambridge, England.

Details of the experiments are given in a letter to *Nature*. These are experiments that Lord Ernest Rutherford, director of the Cavendish Laboratory, has described as important additions to his own previous researches on the constitution of the atom and radioactivity.

Drs. Cockroft and Walton found that when lithium of atomic weight seven is bombarded with protons accelerated at 600 volts, a new kind of splitting of the atom occurs with the release of sixteen million volts of internal energy. The lithium atom apparently captures a proton and then breaks up into two alpha particles with energy of eight million volts each.

Not Practical

Since the proton, the positive particle of electricity and matter, is the nucleus or heart of the hydrogen atom, and the alpha particle is the nucleus or heart of the helium atom, it may be said that lithium, the lightest of metals, was bombarded and combined with hydrogen to form by disintegration the gas helium. More important than this transmutation is the fact that energy wrapped up in the lithium atom was let loose and given to the helium atom hearts or alpha particles that were produced. Quantitatively sixteen millions of volts were obtained whereas only six hundred volts were fed into the transformation. The reason the experiment does not provide a practical source of power is that this occurs only one time in several million attempts.

The experiments of Drs. J. D. Cockroft and E. T. S. Walton at Cambridge, England, are important because they demonstrate that atoms in being artificially smashed can liberate more energy than is put into the smashing process.

Although atoms have been disintegrated before, the kind of splitting discovered by Drs. Cockroft and Walton is novel. Atoms are made up of various building units, principally protons, alpha particles, and loose electrons. The proton is the positive unit of electricity and matter and it is the heart or nucleus of the hydrogen atom. The alpha particle is the nucleus or heart of the helium atom and is made up of four protons and two electrons bound together. The electron is the negative unit of electricity or matter. Atoms are visualized as made up of hearts consisting of protons, alpha particles and electrons wrapped in a compact, heavy nuclear package, surrounded by outside electrons that can be easily removed.

The lithium atom attacked in the Cambridge experiments consists of one alpha particle and three protons with necessary negative electrons to balance the charge of the positive part. The bombardment under relatively low voltage added a proton to the combination, which then split into two alpha particles. The three protons originally in the lithium atom evidently combined with the proton to form another alpha particle.

Lord Ernest Rutherford in 1919 was the first to disintegrate artificially an element when he bombarded nitrogen gas with alpha particles, which are rushing hearts of helium atoms given off by radioactive substances, and obtained hydrogen. It was familiarly said that Rutherford thus knocked H out of nitrogen. Even earlier in 1896 Becquerel in France observed the spontaneous disintegration of the element uranium and thus discovered radioactivity, inaugurating the fruitful search of science into the constitution of matter. Since then it has been discovered that many atoms, particularly the heavy ones, are radioactive and that any of the light ones can be disintegrated (*Please turn page*)

PALEONTOLOGY

Land Animals Small When Coal Was Forming

THERE were giants in the earth in the Coal Age, but they were all trees; weird growths like the modern horsetail rushes, but fifty feet high and a foot thick; others just as strange, with sword-like leaves, that have left no living representatives. But all the land animals, in those days before the dinosaurs, were comparatively puny things; small creatures very much like modern salamanders, not over a foot or two long; though some, by virtue of interminable tapering tails, attained a length of nine feet. And there were a few eel-shaped ones, like the so-called "blind-worms" of the present day.

Their bones are not at all well preserved. Most of the little we know about them comes from impressions of their bodies in coal beds, and from more abundant tracks of their feet in muds that subsequently hardened into shales. But sufficient skeletal material has been gathered to enable the noted paleontologist, Dr. William K. Gregory, to direct the sculpturing of a restoration which can now be seen at the Field Museum of Natural History in Chicago.

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Field Museum Photo.

FROM THE PRIMAL SLIME

Diplovertebron is the formidable name given to this not-very-formidable salamander-like animal that crept through the primal slime of Coal Age swamps. Its descendants, relatively little modified, are found in wet places today.

by bombarding them with the radiations shot out from the heavier radioactive elements.

The experiment of Drs. Cockroft and Walton was not the first that obtained greater energy from an atomic transformation than was put into it.

Prof. W. Bothe, German physicist, reported a few months ago that he bombarded beryllium metal with alpha radiation or helium hearts from radioactive polonium and turned it into carbon, observing gamma rays that might be called artificial cosmic rays to be emitted with more energy than was put into the operation. This advance, reported exclusively by Science Service in a signed article by Prof. Bothe, was hailed as the first successful synthesis of matter and the first atomic transformation that yielded a gain in energy.

Upon the basis of such experiments, the hope of obtaining "something for nothing," that is, getting more energy out of matter than is put into it, is due for a revival. Practical transmutation of one element into another has caught popular and scientific imaginations since the days when chemistry was alchemy. While there is little hope of turning lead into gold or synthesizing hydrogen into helium with a gain in energy that would do the work of the world, the new atomic researches promise to tell more about the way matter is put together. Eventually the syntheses and disintegrations may be put to work, but this will probably take years and decades. In the Bothe experiments only one in fifty thousand of the projectiles hurled hit its mark and the process as a whole is dreadfully inefficient although when hits are made energy is gained. In the Cockroft-Walton experiments for every atom disintegrated several millions of particles were required.

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BACTERIOLOGY

Bacteria Exploded in Making Of New Type of Vaccines

BACTERIA, blown to bits by the sudden release of carbon dioxide that has been literally squeezed into them under a pressure of 800 pounds per square inch, are being used to make vaccines of a new type, without the use of heat, by David Crowther, a New York scientist. Advantages claimed for the new vaccines are that they are more effective and keep better than vaccines made with the use of the heat.

The physical principle involved is exactly the same as that which causes a bottle of pop to "fizz" when the cap is removed. The gas has been introduced under pressure and has gone into solution. When the pressure is released the gas comes out of solution and explodes in bubbles. The same sort of thing happens when grains are "puffed" to make breakfast foods; though here the exploding force is that of steam. Only the bacteria "pop" much more thoroughly than the grains do; they lose any semblance of bodily form and release their protoplasm into colloidal suspension, like white of egg stirred up in water. In this form, the substance of the bacteria has the power to provoke the tissues of organisms into which it is injected to form protective substances or antibodies, just as ordinary vaccines do. While the process is still in the experimental stage, large quantities of vaccines have been made and the experiment continues.

The same process of "popping" living organisms with a gas that dissolves in their tissues under pressure has been used by Mr. Crowther for the destruction of insects and their eggs and larvae, especially species that infest stored products. Possibilities of its use on a commercial scale are seen, where heat or chemical extermination of such pests are not practicable. For example, it is pointed out, neither heat nor chemicals will readily penetrate a package of flour, a bale of cotton or a bag of seed, but such materials, subjected to the pressure of a gas, are readily and completely penetrated.

Spores Not Killed

When the gas pressure is released, temperature is reduced somewhat; but since most of the products that might be treated by this method are not harmed by moderate degrees of cold this does not constitute a serious objection.

The new method is not universal in its applicability, however. Bacterial spores, which are highly resistant resting stages of some species of bacteria, are not killed by it. Yeasts, which often damage food products by starting undesired fermentations, are also difficult to destroy.

Carbon dioxide is not the only gas that can be used, it is pointed out, but it is best in most cases because it is more soluble than other easily obtainable gases, such as hydrogen or nitrogen. For a given working pressure it will therefore have considerably greater effect.

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AVIATION

Navy Airplanes To Be Free of Carbon Monoxide

ALL NEW airplanes built in future for the U. S. Navy will be tested at the factory for the presence of carbon monoxide in the cockpits, and if this deadly gas is found, even in minute quantities, it must be eliminated before the planes will be accepted.

This new requirement is the result of an investigation into the hazard of the pilot from the exhaust fumes of his engine, conducted by Dr. Joel J. White, of the division of aviation medicine of the Navy.

Blood tests of pilots after flights revealed that the highest concentration of carbon monoxide in the blood, 15 per cent. of saturation, was not sufficient to cause unconsciousness, but was enough, if continued over a long period, to have a bad effect on the pilot's health and efficiency. Exposure to a low concentration over a long period is more harmful than a brief exposure to a very high concentration.

A comparatively simple and inexpensive modification of the exhaust leads serves to eliminate the gas from those parts of the plane where it might be breathed by the pilot or passengers.

An interesting feature brought out by the investigation, which is reported in full in a current issue of the *U. S. Naval Medical Bulletin*, is that exposure to the gas was greater in open cockpit planes than in the types with closed cabin.

For convenience in testing for the presence of carbon monoxide, the Bureau of Medicine and Surgery of the Navy in cooperation with C. E. Earle, Navy chemical engineer, and the Mine Safety Appliances Co., developed a new type of carbon monoxide indicator which makes use of a chemical "hopcalite."

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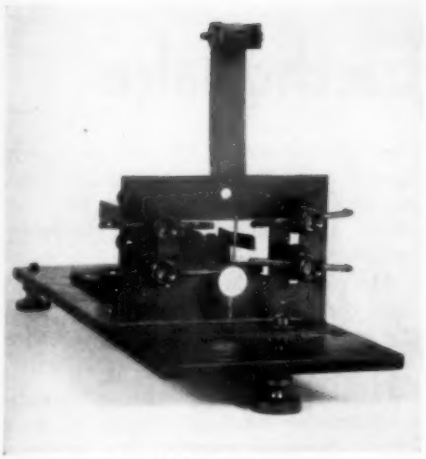

POCKET-SIZE

Baby seismograph, or "accelerometer" devised by Frank Neumann, seismologist of the U. S. Coast and Geodetic Survey, for measuring such things as short-wave vibrations in buildings.

EUGENICS

Encouraging Fit Parents To Bear Children Advised

RACE betterment through the positive measure of encouraging the fit to bear children, instead of the negative one of sterilization of the unfit, was advised by Dr. Percy W. Toombs of Memphis at the meeting of the American Medical Association.

"If the laws of natural inheritance in human beings could be made to seem of as much economic importance as those which govern cattle breeding and poultry raising, progress in this direction would be promoted," Dr. Toombs declared. "It seems unlikely that the human race can be trained to consider selective breeding at the time when such consideration would be most desirable, but something can be done," he added.

The family physician is the best person to do this training, he said. Some of the measures he advocated are attention to diet and posture to improve the physical structure of the child, and immediate care of the expectant mother.

Prevention of rickets, for instance, which causes deformities of the bones, would reduce the number of cripples and also the deformities that constitute serious hazards of childbirth.

Proper diet and correction of faulty posture and carriage during adolescence and the eradication of congenital infections would insure better babies in a succeeding generation, he said.

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SEISMOLOGY

Little Earthquakes of Traffic Recorded by Tiny Seismograph

New Device Is Sensitive Enough to Register Heartbeats Of Man Leaning Against Table on Which It Stands

WHEN a big truck rumbles by, or a flat-wheeled street-car pounds past with such a bump-bump-bump that you think it's surely going to shake the house down, you can get a real record of just how much of a shaking the place is getting, with a new pocket-size earthquake detector which has just been completed by Frank Neumann, seismologist of the U. S. Coast and Geodetic Survey.

Classed as an "accelerometer" by its inventor, it operates on the same principle as the larger, more elaborate, and much costlier seismographs that report the occurrence of earthquakes in distant parts of the earth, often informing scientists of a wrecking shock hours or days before the news is sent by wire.

Mr. Neumann's instrument consists, essentially, of a pendulum and a means of making that pendulum's smallest vibrations seen. The pendulum is a flat, one-ounce bob at the end of a strip of phosphor bronze, hung on bearings as nearly frictionless as possible. It is hung horizontally, not vertically as in a clock, so that it will record the sidewise shiftings rather than the up-and-down jigglings of the structures whose tremors it is intended to measure.

The movements of the pendulum are very small, so that it is necessary to find a means of magnifying them greatly to make them visible and to get a record for analytical study by scientists. This is done by means of a tiny circular mirror, so hooked up to the pendulum that it causes a beam of light to shift, like a long, weightless pointer, registering a hair's-breadth change in the position of the pendulum by a shift of an inch or more in the position of the light-spot on a ground-glass screen or—for permanent record—on a slowly moving sheet of photographic paper.

The hook-up of the mirror to the pendulum, as devised by Mr. Neumann, is the most unique part of the apparatus. From the front end of the pendulum project two metal prongs. Stretched between them is a bit of thin, exceedingly flexible metal ribbon. One turn of this goes around a slender steel rod, only about one twenty-fifth of an inch in diameter, on which the little mirror is mounted. Thus a very small movement of the pendulum gives a greatly magnified twist to the rod, and causes the mirror to swing through a wide angle. So sensitive is the device that it will register the heartbeats of a man leaning against the table on which it stands.

To prevent the pendulum from swinging too freely, it is "damped" by laying a film of castor oil between its lower surface and a flat piece of glass mounted just under it. Castor oil has the great advantage over most thick vegetable oils, of not drying out and becoming more viscous on exposure to the air; neither does it break down and turn rancid.

The possible uses of devices like Mr. Neumann's accelerometer are many. Engineers have suspicions that tremors of less than earthquake intensity, incessantly applied, may be damaging to buildings, piers, chimneys and other structures. But practical instruments for measuring the shakings due to traffic, wave action, high winds and other artificial and natural forces have not been worked out until within comparatively recent time.

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ANTHROPOLOGY

British Anthropologists Doubt Age of Oldoway Man

STRONG skepticism that the Oldoway skeleton from East Africa has a right to the important sounding title "oldest known authentic skeleton of homo sapiens" is expressed by two zoologists, C. Forster Cooper of Cambridge University and D. M. S. Watson of the University of London, in a communication to *Nature*.

The human skeleton which has awakened a spirited controversy among scientists was unearthed at Oldoway, Tanganyika, in 1913 and has been a storm center in discussions at intervals since.

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SEISMOLOGY

Your Chances of Death by Earthquake

Persons Living East of Rockies Have One Chance In Five Millions of Dying Thus Within Any Single Year

By WATSON DAVIS

EVERY DAY somewhere in the world there is an earthquake. Every so often there is trembling of the earth so severe that houses are destroyed and human lives are lost, as recently happened at Santiago de Cuba, the city famed for its severe earthquakes in the past as well as the shaking that was given the city by Roosevelt and his rough riders.

When next you read the news of a severe earthquake in some distant land and look apprehensively at the ceiling above you, wondering if the solid earth will prove traitorous in your own home town, remember these figures:

There is only one chance in five millions that in any one year you will be killed by earthquake, provided you live in the U. S. A. east of the Rockies.

There is only one chance in five millions that in any particular year the area about your home extending for 25 square miles will be stricken by a badly destructive earthquake, provided you live east of the Rocky Mountains.

These mathematical chances have been computed by John R. Freeman, Providence, R. I. engineer, who has just completed a survey of the earthquake risk in the country. If you live on the Pacific coast, the chances are about one in a million, and perhaps greater in certain coast sections which are admittedly an active earthquake region.

The danger from earthquakes is thus extremely small in comparison with hundreds of every-day situations and dangers, such as getting run over by automobiles.

But this does not mean that this country is immune from earthquakes, even in the area where no destructive quakes have been recorded in all the years that white men have been on this continent.

The experts confidently expect that somewhere in the 2,500,000 square miles east of the Rockies once in each century there will come a destructive earthquake resembling the shock that visited Charleston, S. C., in 1886. Within each century there is also expected another quake causing smaller damage.

West of the Rocky Mountains, particularly in California, the earthquake hazards are many times greater than those estimated for the eastern and central states.

History and geology show, according to Mr. Freeman, that somewhere within the State of California a seriously destructive earthquake like the one at Santa Barbara in 1925 should be expected at some one locality on the average of about once in from twenty to fifty years. These earth disturbances will probably occur not far from the ranges of hills and mountains near the coast. Less serious earthquakes are to be expected in California at more frequent intervals.

Destruction Confined

While we live with these probabilities hanging over our heads, it is somewhat comforting to know that even the great earthquakes do not spread destruction over very large areas. Mr. Freeman estimates that the one great quake of the century to be expected east of the Rockies will be felt destructively over an area of only twenty-five square miles. In that region, two-thirds of the chimney tops will be shaken off houses, and perhaps half of all the houses will have their plaster and partitions cracked. There will be a score or more poorly designed or poorly built structures which will collapse wholly or in part, causing some loss of life of persons in the houses or on the sidewalks outside.

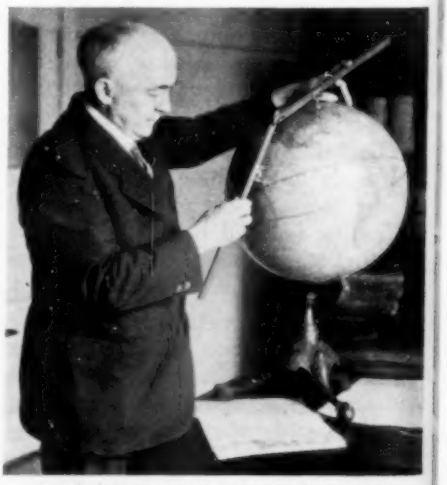
Records assembled by Mr. Freeman show that only about 930 people have been killed by earthquakes within the United States and Canada during the last century. In the next century he estimates that there may be 2,000 killed by earthquakes occurring east of the Rockies, and there may be an equal or even greater number lose their lives on account of earth shocks in the Pacific Coast region.

Should a great earthquake come during business hours to a large city like Los Angeles, the death toll may run to many thousands. And the blood of these earthquake victims will be largely upon the hands of the architects, builders and public officials who have allowed the construction of top-heavy buildings.

Mr. Freeman describes how he looked from the window of a tall office building in Los Angeles and imagined what would happen if an earthquake came.

"I saw on a principal street the ordinary midday sidewalk crowds of more than a thousand people," Mr. Freeman said. "They walked beneath tall unbraced brick parapet walls and false fronts designed to make three or four-story buildings look taller. A severe earthquake, such as seems certain to occur in this region sooner or later, would instantly topple these walls on the heads of people below, killing literally hundreds."

Contrary to popular opinion the danger to human life from earthquakes in the United States is greatest not inside houses but on the sidewalks. This is the case because many American buildings are constructed with brick and other materials that a slight shaking would detach and throw down upon the sidewalks and into the streets. There are parapets upon the tops of buildings intended to make them look taller than they really are. Veneers of brick, tile and thin slabs of stone only weakly tied to the walls of the building and heavy overhanging cornices will under even a slight earthquake



LOCATING AN EARTHQUAKE

Making use of seismological records from widely separated stations, N. H. Heck, of the U. S. Coast and Geodetic Survey, determines the point on the earth's surface directly above the focus of the quake.

DANGER LINES

Map with heavy black markings which indicate the world's principal earthquake regions.

shock shake loose and fall to earth.

Loss of life has happened to be relatively small in the great earthquakes experienced by the United States because these have come outside of working hours when few people were on the streets. This may not be the case in the next great earthquake. There is no reason for earthquakes happening more often at night or outside of working hours. There is a chance of one in three (the ratio between eight hours and twenty-four) that the next great earthquake in a populated American city will come when many people are on the sidewalks. Down upon them will come loose bricks and stone, and there will be many fatalities. In the closely built business districts of most American cities life during an earthquake is much safer inside the buildings than immediately outside.

Of course, there are some buildings more dangerous to the lives of people inside the building during an earthquake than to those outside. These are structures in which walls are made of structural units weakly cemented together or with fronts or curtain walls insecurely fastened to the main body of the structure.

Outside of the United States the loss of human life in great earthquakes, aside from that caused by fire following the quake, has occurred largely inside of buildings of top-heavy construction which, falling, crush those within. In Italy, Greece, Central America, and Chile great losses of life have occurred because many of the buildings were made of stone feebly held together with weak lime mortar, and floors and roofs were heavy and only weakly supported.

Mr. Freeman recalls that the Messina-Reggio Italian earthquake of 1908 killed 100,000 people largely because this type of building predominated. If, Mr. Freeman says, an army equal in numbers to all the inhabitants of the stricken Italian cities had been encamped in tents on the same site probably not a single life would have been lost as the result of this earthquake.

To protect the American public from earthquake danger due to poor building, Mr. Freeman and other engineers are urging that architects, engineers and builders, as well as city officials, realize the necessity of building earthquake-proof structures. Only a small additional cost would be required to make practically all modern buildings fairly safe against a severe earthquake.

Earthquake Proof

Almost any building, according to Mr. Freeman, can be made earthquake proof if the designer and builder will provide sufficient strength so that the building will withstand a horizontal force, at each floor level, equal to a tenth of the weight of the building above that level. If all buildings were planned and erected with this provision as a rule, thousands of lives would undoubtedly be saved in future years.

If leading seismologists and earthquake experts were asked "what large American city is likely to be visited by a destructive earthquake?" many of them would answer:—"Los Angeles."

While California is admittedly in the active earthquake area of the world and the rest of the United States is not, this does not mean that earthquakes are impossible in other large American cities. The Charleston, S. C. earthquake of 1886 occurred in an area in which destructive earth shocks had never before been recorded. In 1811 in a then unsettled Mississippi Valley area, which now includes Memphis, Tenn., there occurred the New Madrid earthquake which is considered the most severe that the United States has ever experienced within the historic period. Boston in 1755, when it was a very small city, had a destructive earthquake which ranks among the largest felt within this country. Quebec and the lower St. Lawrence River experienced severe quakes in 1633, and in 1925 there was an earthquake which did considerable damage in the same region. While the destructive effects of the severe submarine quakes located on the Grand Banks off Newfoundland in 1929 were confined to the breaking of twelve trans-Atlantic cables, the tidal wave that it caused drowned thirty Nova Scotians at one point. If this quake had occurred upon land it would have undoubtedly caused much greater loss of life.

Confronted with this record of destructive earth disturbances in areas not popularly considered to be subject to earthquakes, there is nevertheless some comfort in the opinion of experts that nothing worse than the most severe past earthquakes, such as the San Francisco earthquake of 1906, the New Madrid earthquake of 1811, and the Great Owens Valley California earthquake of 1872, appear to be even remotely probable in the United States or Canada in the future.

As to New York, America's largest city, with its towering skyscrapers on the island of Manhattan, Mr. Freeman thinks it one of the safest spots from earthquake hazard along all of the Atlantic seaboard. This is because of New York's rigid bed-rock foundation which lies close to the surface and its favorable record of freedom from noteworthy quakes throughout a period of three hundred years.

The actual motion of the earth that causes damage during an earthquake is very slight. It is estimated that the vibration is seldom more than a quarter or half an inch in extent, and even on soft ground where damage in the San Francisco earthquake was greatest, the total movement back and forth probably did not exceed one inch. Engineers and geophysicists believe this to be true even though eye-witnesses to earthquakes have claimed to have seen ground rise and fall several feet. These very large movements of the earth are attributed to fright rather than actual movement. (*Please turn to page* 312)

ARCHAEOLOGY

Mayan Throne Discovered In Guatemalan Wilderness

ARCHAEOLOGISTS exploring in the Maya country in Guatemala have discovered something new, the real throne where a ceremony recorded in Mayan art took place.

Word of the unusual discovery has just been received at the Museum of the University of Pennsylvania. The expedition is one sent out by the Museum under direction of Dr. J. Alden Mason. The archaeologists are exploring ruins of the old Mayan city of Piedras Negras, meaning "black stone."

Last year the same expedition found a masterpiece of Mayan carving in the form of a door lintel covered with picture writings and groups of Indians. The artist had made a sculptured record of some important ceremony at a throne.

Now, digging at the same ruins where the masterpiece was found, Dr. Mason has discovered the very throne, with its beautiful, ornate background, which the Mayan Phidias portrayed. There is no doubt, he reports, that the ceremony portrayed on the lintel was performed at Piedras Negras upon this throne.

The throne had an impressive setting. At the top of a long, fine stone stairway stood a colonnaded structure. And against the back wall of this structure, was the throne.

The expedition has been excavating at the pyramid where the lintel was unearthed last season, and also at another pyramid. Under this latter pyramid two temples have been located. The nature of these hidden temples is still to be determined.

Science News Letter, May 14, 1932

MEDICINE

Two Farmers Contract Rare Fungus Disease of Tongue

TWO CASES of a rare fungus disease of the tongue have been reported by Dr. Olin J. Cameron of the University of Michigan to the American Medical Association. The disease corresponds to "lumpy jaw" in cattle, and both Dr. Cameron's cases were contracted by farmers as a result of chewing straws of grass, hay or grain.

The technical name for the disease is actinomycosis. Only 55 cases of the disease occurring primarily in the tongue have been reported since the first case was identified in 1885. The disease gets its popular name from the lumpy tumors which form in the tongue and jaws, though it has been found that the fungus may develop in other parts of the body.

The disease is more common in men than in women, and so far as is known occurs only in adults. It has been successfully treated by opening the tumor formed by the growth of the fungus, and by application of X-rays of radium, and certain drugs taken internally.

According to one theory, the fungus lives normally inside husks or sheaths of barley or other grains and grasses. Another theory explains that the fungus lives normally in the human mouth, lying dormant in decayed teeth, and that it enters the tissues of the mouth when they are pierced by a jagged tooth, a splinter of wood, or a grass stem or grain beard.

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PHYSICS

New Instrument Detects Single Cosmic Rays

COSMIC rays plunging to earth from the depths of outer space are recorded unambiguously in a fifteen-foot iron tube detector, Drs. W. F. G. Swann and J. C. Street of the Bartol Research Foundation of the Franklin Institute, announced to the American Physical Society.

About four times each hour the cosmic rays travel the whole length of the nitrogen-filled tube and cause a spurt of electrical current that Drs. Swann and Street find is twenty times that caused by the passage of an alpha particle or heart of a helium atom. They have thus obtained direct evidence that the cosmic radiation occurs in individual packets and that it might be considered a series of bullets with high energy.

In their measurements of the cosmic rays with the fifteen-foot tube, Drs. Swann and Street found evidence of radiations that are even more electrically exciting than the cosmic rays. Spurts of ionization current larger than those caused by the cosmic rays were consistently recorded. They seem to be caused by something that happens inside the tube. Dr. Swann suggested that these unknown radiations may be the same as the rays discovered by Prof. G. Hoffmann, German physicist, and attributed by him to the breaking down of the hearts of atoms in the wall of the iron tube.

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IN SCIENCE

PHYSIOLOGY

4 in 100 "Sensitive" To Vital Sulfur Compound

BETWEEN three and four out of every hundred individuals, whether men, mice or rats, are "sensitive" to sulfhydril, the chemical group consisting of one atom of sulfur and one of hydrogen which has been called the key-compound to life itself, Dr. Stanley P. Reimann of the Lankenau Hospital Research Institute of Philadelphia has reported to the American Association of Pathologists and Bacteriologists.

It is the sulfhydril group which makes possible the growth of plants and animals by cell division, and consequently their very life, Dr. Frederick S. Hammett says. When this same group becomes oxidized, that is, when it adds oxygen to itself, it loses its power to stimulate cell division and actually checks it. The discovery that certain individuals are "sensitive" to sulfhydril may throw light on many problems of cell division now unsolved, among them cancer, which is a state of riotous cell division. Dr. Reimann suggested further study along this line.

Science News Letter, May 14, 1932

BACTERIOLOGY

Typhus and Spotted Fever Germs Grow Differently

THE GERMS of typhus fever and of spotted fever are very much alike, but differ in the important respect of growing in different parts of the cells they invade, Dr. Henry Pinkerton of Peter Brent Brigham Hospital, Boston, and Dr. G. M. Hass of Children's Hospital, Boston, reported to the American Association of Pathologists and Bacteriologists.

The spotted fever germs grow and multiply massively in the nucleus of the cells, but infect the surrounding part of the cell only sparsely, they found from studying how the germs grow on animal tissues. Typhus fever germs, on the other hand, do not invade the nuclei of cells, but grow on the cytoplasm in another part of the cell.

Science News Letter, May 14, 1932

NCE FIELDS

MEDICINE

Lack of Sulfur May Be Cause of Arthritis

INDICATION that in arthritis, popularly called rheumatism, the sulfur balance of the body is disturbed appeared in a study reported by Dr. M. X. Sullivan of Georgetown University at the meeting of the Federation of American Societies for Experimental Biology. Dr. Sullivan examined tiny bits of fingernails of arthritics and normal persons. In the arthritic fingernails he found much less cystine, which is the chief sulfur-containing building block of the body. Dr. W. P. Argy of Georgetown University and Dr. J. Wheeldon of Richmond are following up this discovery by treating arthritic patients with injections of very finely divided sulfur.

Science News Letter, May 14, 1932

PLANT PHYSIOLOGY

Solidest Tree Is Twenty To Forty Per Cent. Gas

THE SOLIDEST and soundest kind of wood is not really solid at all. It is full of air—twenty to forty per cent. of its total bulk consists of gases, trapped in the minute tubes and cell cavities that all wood is made of.

This appears from the researches of Dr. D. T. MacDougal of the Carnegie Institution of Washington, who reported them before the meeting of the American Philosophical Society. Dr. MacDougal has been at work on the problem of the gases in trees for over seven years.

The gases he extracted from various kinds of tree trunks were made up of the same constituent parts as air, but in greatly different proportions. Oxygen, making up slightly over a fifth of atmospheric air, is sometimes entirely lacking, and never makes up as much as a fifth of the "atmosphere" of a tree trunk. Carbon dioxide, on the other hand, is far more abundant in tree-trunk gases than it is in the air. The normal atmosphere contains only three or four tenths of one per cent. of carbon dioxide, while the carbon-dioxide content of tree-trunk gases runs as high as 26 per cent., and the proportion rarely falls below one per cent.

The gases imprisoned in cavities in trunks of living trees are in contact with the wet walls of vessels conveying water up to the leaves. Naturally, they pass into solution in this sap, and are presumably used over again in the life processes of the tree. This would account for the low oxygen content. It is probable also that the carbon dioxide, by-product of vital processes, is reabsorbed, carried to the leaves where food-making is in progress, and used over again to build up sugars and starch.

Science News Letter, May 14, 1932

PALEONTOLOGY

Fossils Show Aardvark Had Relatives in America

AARDVARKS, which now live only in Africa and are about the queerest-looking mammals that walk, had relatives in America fifty-odd million years ago. Fragmentary remains that probably represent a Lower Eocene "ant-bear," found in Wyoming, were described before the meeting of the American Philosophical Society by Dr. G. L. Jepsen of Princeton University.

The two existing species of aardvark look like something out of the geologic Dark Ages. It is a clumsy-bodied animal about the size of a pig, with huge ears, long snout and claw-armed feet which it uses for digging into ant-hills for its favorite insect food. It can also retreat into the ground with amazing digging speed when threatened; whence its name, which is Boer-Dutch for "earth-pig."

Aardvarks occupy an order of mammals by themselves, due, in large part, to the curious structure of their teeth which are composed of hundreds of "tubules" of dentine, each "tubule" having its own slender nerve tube. This is a character of great contrast to the single pulp or nerve cavity in teeth of ordinary mammals. Teeth of *Tubulodon taylori*, the new Eocene fossil, already foreshadow the modern structure of aardvark teeth by having both a central cavity and numerous tubules.

Chemical examination of the fossil lumps of undigested food remains found with the Wyoming fossil bear out the evidence furnished by bones and teeth that it was a relative of the aardvark. They contain chitin, which is the hard horny substance of which the outer skeletons of insects are formed.

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BOTONY

Dove Orchid Makes Fitting Flower for Whitsunday

See Front Cover

SUNDAY, May 15, is the Feast of Pentecost, or Whitsunday, when many of the churches commemorate the descent of the Holy Spirit. In the lands of tropical America, where delicate orchids can be had by anybody, many an imaginative Latin will mingle poetry with his piety as he looks upon the Dove Orchid, with the little brooding figure of the symbolic bird hovering at its heart. Throughout the warm countries where it grows, this exquisite blossom is known as the "Flower of the Holy Ghost."

The "dove" and the two structures on either side, which might be considered uplifted hands or tongues of flame as one prefers, really have to do with the sending and receiving of pollen. The poetic figure is therefore appropriate from a botanical point of view also, for the brooding "dove" is instrumental in perpetuating the life and insuring the distribution of the species.

The photograph of the Dove Orchid reproduced on the cover of this issue of the SCIENCE NEWS LETTER appears through the courtesy of the Missouri Botanical Garden.

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HISTORY

Yucatan History Published After Wait of 300 Years

AHITHERTO unpublished history of Yucatan, written in 1639, is being printed by Luis Rosado Vega, director of the Yucatan Historical and Archaeological Museum.

This history of Yucatan, where the Spanish conquerors found the remarkable Mayan Indian civilization, was compiled by order of the Spanish king. Only three hand-written copies were produced. Of these three, only one is known to exist today. It is in the British Museum. This rare manuscript is signed by its author, Francisco de Cardenas y Valencia, a priest in Sotuta, Yucatan.

The book describes the military and religious subjection of the Mayan Indians, records many valuable details about the land and its people. This Mayan history is nearly 50 years older than the famous history of Yucatan written by the monk Cogolludo.

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MEDICINE

Hay Fever First Described

"A Classic of Science"

A Century Was to Elapse Before Medical Science Could Answer the Riddle of This Odd "Periodical Affection"

CASE OF A PERIODICAL AFFECTION OF THE EYES AND CHEST. By John Bostock, M.D. F.R.S. & L.S. Read March 16, 1819. *Published in Medico-Chirurgical Transactions, Medical and Chirurgical Society of London. Vol. X.* 1819.

THE following case, it is presumed, will not be altogether uninteresting to the Society, as affording an example of an unusual train of symptoms, and it may perhaps be considered the more worthy of their attention, from its having occurred in the person of the narrator.

Rather Delicate Habit . . .

J. B. act. 46, is of a spare and rather delicate habit, but capable of considerable exertion, and has no hereditary or constitutional affection, except various stomach complaints, probably connected with, or depending upon, a tendency to gout. About the beginning or middle of June in every year the following symptoms make their appearance, with a greater or less degree of violence. A sensation of heat and fulness is experienced in the eyes, first along the edges of the lids, and especially in the inner angles, but after some time over the whole ball. At the commencement the external appearance of the eye is little affected, except that there is a slight degree of redness and a discharge of tears. This state gradually increases, until the sensation becomes converted into what may be characterized as a combination of the most acute itching and smarting, accompanied with a feeling of small points striking upon or darting into the ball, at the same time that the eyes become extremely inflamed, and discharge very copiously a thick mucous fluid. This state of the eyes comes on in paroxysms, at uncertain intervals, from about the second week in June to the middle of July. The eyes are seldom quite well for the whole of this period, but the violent paroxysms never occur more than two or three times daily, lasting an hour or two each time; but with respect to their frequency and duration there is the greatest uncertainty. Generally, but not always, their invasion may be distinctly traced to some exciting cause, of which the most certain is a close moist heat, also a bright glare of light, dust or other substances touching the eyes, and any circumstance which increases the temperature. After the violent inflammation and discharge have continued for some time, the pain and redness gradually go off, but a degre of stiffness generally remains during the day.

After this state of the eyes has subsisted for a week or ten days, a general fulness is experienced in the head, and particularly about the fore part; to this succeeds irritation of the nose, producing sneezing, which occurs in fits of extreme violence, coming on at uncertain intervals. To the sneezings are added a farther sensation of tightness of the chest, and a difficulty of breathing, with a general irritation of the fauces and trachea. There is no absolute pain in any part of the chest, but a feeling of want of room to receive the air necessary for respiration, a huskiness of the voice, and an incapacity of speaking aloud for any time without inconvenience. To these local symptoms, are at length added a degree of general indisposition, a great degree of languor, an incapacity for muscular exertion, loss of appetite, emaciation, restless nights, often attended with profuse perspirations, the extremities, however, being generally cold. The pulse is permanently quickened, from 80, the average standard, to about 100, and upon any considerable exertion it rises to 120 or more.

In Its Worst State . . .

This is an account of the complaint in its worst state, which, however, it does not assume in every season, and indeed its violence is generally less than is here described. The affection of the eyes is recollected to have occurred when the patient was eight years old, and there has been more or less of it every year since; the sneezings came on nearly at the same period, but the first attack of the chest was at the age of sixteen or seventeen. Generally speaking, the complaints have increased for the last twenty years, although not progressively. All the acute symptoms disappear about the end of July, but a considerable degree of weakness and languor is left, which remains a month or six weeks longer. It has happened that the most severe summer complaints have been experienced, after the patient had enjoyed the best health during the preceding spring. On the contrary, it has been thought that after a severe summer attack, the patient has more completely and more rapidly regained his usual state of health and strength in the autumn.

Stopped by a Journey . . .

The remedies employed have been various, and they have been persevered in with an unusual degree of steadiness. Topical bleeding, purging, blisters, spare diet, bark and various other tonics, steel, opium, alterative courses of mercury, cold bathing, digitials, and a number of topical applications to the eyes, have been very fully tried, but it is doubtful whether any distinct or permanent benefit has been derived from any of them. The complaint once seemed to be decidedly stopped by a journey, but in other instances it has existed while the patient was travelling. By using every means for obtaining fresh air, without much exertion, and by carefully avoiding a moist and close atmosphere, the symptoms may in some measure be kept off, but they have frequently appeared under circumstances that seemed the least likely to have produced them.

It may form an important addition to the narrative to state, that during the last summer the patient was so situated as to be able to avoid almost every degree of bodily exertion; he remained nearly confined to the house for about six weeks, and the result was that, notwithstanding the unusual warmth of the season, he experienced much less of the affection than he had done for several years before.

ENTOMOLOGY

Worst Grasshopper Outbreak In 50 Years Faces Farmers

Crops Will Be Lost Unless Congress Provides Funds for Distributing Poison on Fields Before Insects Hatch

ON TOP of low prices, crop failures and general financial setbacks, another and more relentless foe is coming to plague the farmers this summer —grasshoppers.

Field surveys just made by representatives of the U. S. Bureau of Entomology confirm earlier predictions that with favorable weather, the country is soon to experience the worst grasshopper outbreak of the last half century.

Already throughout the West, young 'hoppers are about to waken from their winter's sleep and begin ravaging the farmer's crops. Reports from Texas and Oklahoma say that the insects have emerged from their membranous sleeping bags and started inroads on pastures, alfalfa and small grains.

New Battleground

As the focus of last summer's operations, south central South Dakota and north central Nebraska are expected to be most severely pillaged by the grasshopper. This year, in addition, the section comprising northeast North Dakota and northwest Minnesota is regarded as an equally important battleground. Iowa, Montana, Wyoming, and Colorado form the secondary zone of conflict, while locally in almost every other western state insect forces will be encountered.

Grasshopper troops will begin general mobilization any day now, says Dr. W. H. Larrimer, Federal entomologist. A few days of warm weather, he says, is all that is necessary to bring them out in battle array.

"There will be far more grasshoppers this summer than last," Dr. Larrimer stated, "and the total area infested will be much larger than before."

The ill foreboded in this statement is quite evident. Last summer in Nebraska and South Dakota alone, more than three-fourths of the crops on 4,800,000 acres spread over 17,000 square miles of territory were completely destroyed, resulting in untold financial losses.

While the seriousness of a grasshopper plague is fully realized in the West, Dr. Larrimer said, several states are unable to meet the situation with their own resources. Distributing poison-bran mash is the best known means of combating the insects, but funds to procure the mash and spread it on the fields are lacking.

Battle plans of the U. S. Bureau of Entomology have been formulated but cannot be pursued until Congress acts on a bill now before it. This bill, backed by President Hoover, would have the government put up $1,450,000 to buy the defensive poisons and make them available to the farmer this summer. The farmers themselves will then furnish an equivalent amount of labor for the spreading of the bran mash on the fields. The cost of protecting the crops against the devastating 'hopper is figured to be about twenty to twenty-four cents per acre.

The peak of the damage done by grasshoppers will not be reached until July when the insects have wings and migrate in great swarms, but it is in May, the Federal entomologist stated, that protective measures are effective. The task of fighting the grasshopper, Dr. Larrimer said, would be considerably lightened if nature were to inaugurate a spell of cold, wet weather for about two weeks after the bulk of the insects hatch. In that event numbers of the 'hoppers would be destroyed.

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PHYSICS

"Ether Drift" Differences May Find Reconciliation

A POSSIBLE reconciliation between the at present discrepant results of "ether drift" experiments has been presented to the American Physical Society by Dr. N. Galli-Shohat of Bryn Mawr College. This famous experiment, known as the Michelson-Morley experiment for the men who first performed it, failed to show any positive evidence of the existence of an ether, and set a train of scientific investigations in motion that eventually led to Einstein's relativity theory. Later, Prof. Dayton C. Miller of Case School of Applied Science, Cleveland, repeated the experiment, and reported positive results. Dr. Galli-Shohat reconciles this disagreement by taking into account, not the earth's motion about the sun, but the motion of the whole solar system through space.

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METEOROLOGY

New York Will Be Flooded By Melting of Great Ice Caps

NEW YORK is destined to become an American Venice. Her streets, canyoned by skyscrapers, will be filled with water to the twelfth floor.

This is the fate of the world's largest city and of all lowland cities, pictured by Dr. W. J. Humphreys of the U. S. Weather Bureau before the American Meteorological Society meeting in Washington.

The filling of Wall Street with water will follow the melting of the great ice caps of the earth to raise the ocean level about 150 feet, Dr. Humphreys said. We do not expect this tomorrow, he qualified, but it is on the way. And the more the earth's permanent ice melts, the faster that which is left turns into water.

Explorations of the past year which determined by sonic sounding the average thickness of the great Greenland ice sheet to be about one mile, make possible a fairly accurate estimate of the height the ocean will rise, it was pointed out. Little has been known in the past about the quantity of ice on the earth.

Dr. Humphreys said there must be 4,000,000 cubic miles of ice on Greenland, the Antarctic continent and Iceland. The earth is slowly getting warmer and eventually all will melt, scientists generally conceded.

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FROM PAGE 307

Earthquakes occur because the earth is still growing. The outer shell of the earth, some forty to sixty miles in thickness, is cracked in thousands of places. As many thousands and millions of years of geologic time pass, blocks of the crust of the earth slip upon one another. A motion of only a few thousandths of an inch is sufficient slippage to cause a great earthquake.

When an earthquake takes place anywhere in the world it sends subterranean signals. These can be received and recorded by seismographs and interpreted by earthquake experts. In many cases long before telegraphic dispatches carrying the news of destruction and loss of life can reach the outside world, scientists are able to tell that an earthquake has occurred. Through an earthquake reporting service operated by Science Service with the cooperation of the United States Coast and Geodetic Survey and the Jesuit Seismological Association, it is now possible to locate definitely the center of each earthquake a very few hours after it happens. The earthquake sends its own dispatches to the seismologists who have the proper instruments and their experience allows them to read the story of the earthquake in these earth-conducted messages.

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PSYCHOLOGY

Lack of Ability Is One Cause of Illiteracy

LACK of educational opportunity is not entirely to blame for illiteracy in this country; many adults who have not completed the elementary school failed to do so because of relatively low native capacity for learning, it was indicated by a report of Dr. J. W. Tilton of Yale University to the New York Branch of the American Psychological Association.

Dr. Tilton's conclusion was based on tests given at a summer school for adults in grades 1 to 8 conducted by the South Carolina State Department of Education. Standard tests were used to measure progress in learning reading, writing, arithmetic, and spelling, and intelligence tests were also given. Those who had had the least schooling made the least gain and had the lowest average mental age.

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PHYSIOLOGY

Doctors Measure Blood Flow Without Cutting Open Vein

THE AMOUNT of blood flowing in veins and arteries can now be measured without cutting open the blood vessel, through the use of a "thermostromuhr" apparatus constructed by Drs. J. F. Herrick and E. J. Baldes of the Mayo Foundation. The method was invented by Dr. H. Rein, physicist of the University of Freiburg, Germany. It has not yet been applied to measurement of blood flow in man.

This result, useful to physiologists in estimating the efficiency of various organs of the body, has been achieved by steadily supplying a small amount of heat to the blood vessel and noting how much the temperature rises at that point. The faster the blood is flowing the smaller will be this artificial increase in temperature. It has then been possible for Drs. Herrick and Baldes, knowing the amount of heat supplied and the rise in temperature, to calculate the volume of blood passing per second.

A comparatively simple operation is necessary to insert the necessary electrical terminals in the neighborhood of the vein. Two metal plates pressed on opposite sides of the blood vessel carry a high-frequency alternating current and thus heat the vein. This "diathermic" method of heating the body tissues by high-frequency electricity is widely used by the medical profession.

The temperature, which never rises more than a tenth of a degree, is measured with the help of a thermocouple, an electrical device which conveys the temperature change to an electrical recording instrument.

The flow of blood to the kidney under various conditions has been successfully measured here by the method.

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ANIMAL PATHOLOGY

War Against Foot and Mouth Disease Shifts to New Area

SOUTHERN California's war against foot and mouth disease shifted suddenly during the week-end of May 8 to San Bernardino County, forty miles from the scene of its first outbreak in Orange County and almost directly east of Los Angeles.

Near the town of San Bernardino a herd of three thousand infected and exposed garbage-fed hogs have been discovered, killed and buried. An area six miles square has been placed under strict quarantine by U. S. Department of Agriculture authorities, to prevent the movement of any animals or materials that might carry the disease.

Orange County, south of Los Angeles, now presents the appearance of a clean-up. A total of 16,300 hogs in several herds have been destroyed there since the first discovery of foot and mouth disease during the last days of April. Bright, warm, dry weather prevails, and this is always favorable to the efforts of the clean-up men.

As yet it has not become necessary to ask Congress for additional funds for use in the campaign. Dr. John R. Mohler, chief of the bureau of animal industry of the U. S. Department of Agriculture, stated to Science Service that the emergency fund left over since the California outbreak of 1924 has not yet been exhausted, and that thanks to the present low market price of livestock it may be possible to reimburse the farmers for the hogs which have been killed without asking for more money.

A feature of the present outbreak has been the confinement of the infection to hogs. There are very few cattle in the quarantined areas, and of these only thirty-three have been destroyed. None of these cattle actually had the disease, but they had been exposed; and since they were all dry cows of little value they were killed as a safety measure.

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DR. DAVID WHITE

—of the U. S. Geological Survey, who received the Mary Clark Thompson medal for outstanding researches in paleontology.

SCIENTIFIC AWARD

Paleontology Medal Awarded to David White

DR. DAVID WHITE, Senior Geologist of the U. S. Geological Survey and a member of the National Academy of Sciences, was recently the recipient of one of the Academy's principal awards—the Mary Clark Thompson gold medal for distinguished service in paleontology.

This signal honor followed on the heels of Dr. White's election to honorary membership in the Geological Society of Belgium, in recognition of his worldwide preeminence in his chosen field.

He is also the recipient of the honorary degree of Doctor of Science in 1924 from the Universities of Cincinnati and Rochester and in 1925 from Williams College. Dr. White is a native of Wayne County, New York, and is a graduate of Cornell University.

Although Dr. White's life work has been done in the field of pure science, he was awarded last year the Penrose medal of the Society of Economic Geologists as a result of his contributions to economic geology. Dr. White is regarded as perhaps the leading authority in the world on the now extinct plants whose fossil imprints are found so abundantly in the roof shales of many valuable coal seams.

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ANTHROPOLOGY

Three Neanderthal Skeletons Discovered in Palestine

THREE adult skeletons of Neanderthal men who lived in Palestine some seventy-five thousand years ago have been discovered by the Joint Expedition of the American School of Prehistoric Research and the British School of Archaeology at Jerusalem, according to cabled report just received by Dr. George G. MacCurdy of Yale University. Dr. MacCurdy is director of the American School.

Dr. MacCurdy pronounced this the greatest discovery of Neanderthal remains that has ever been made.

The skeletons were found near Athlit, Palestine, near the Mediterranean seacoast, about sixty miles from Jerusalem.

The skeletons found at Athlit are the third discovery of Neanderthal remains in Palestine within eight years. A cave near the Sea of Galilee yielded the first skull in 1925, and the discovery of this long-departed type of human beings in the Near East created a stir in the world of science. The skull was the first of the Neanderthal type ever found outside of Europe.

The second discovery, that of a Neanderthal child's skeleton, was reported last May near Mt. Carmel. This find, like the present one, was made by Dr. Theodore D. McCown of the University of California, who is field director of the joint expedition.

By PROF. GEORGE G. MacCURDY

of Yale University, Director of the American School of Prehistoric Research.

THE RECORDS bearing on the physical characters of Neanderthal man are still relatively rare. But in the past few years they have become much more complete than are those of the pre-Neanderthal period, when such beings as Eoanthropus, Pithecanthropus, Sinanthropus, and Homo Heidelbergensis existed.

Neanderthal man lived in the third inter-glacial and the early part of the fourth glacial epoch. In his physical make-up he retained many primitive characters, due to his branching from the main human stem as early as the Pliocene epoch. His lowly estate physically is even reflected in his kit of tools. Although a hunter, he never got so far as to represent by means of carvings, engravings, or drawings in color the animals he hunted. This step was taken by his successor, the so-called race of Cro-Magnon.

The cable received from Theodore D. McCown, field director of the Joint Expedition of the American School of Prehistoric Research and the British School of Archaeology at Jerusalem, said:

"Three adult Mousterians surely Neanderthal, heavy brow ridges, taurodont dentition."

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ARCHAEOLOGY

Gem Impressions Puzzle Archaeologists at Ur

ARCHAEOLOGISTS digging into the ruins of Ur of the Chaldees are frankly puzzled to account for contents of a coffin they have unearthed in the floor of a house.

When discovered, the coffin had been plundered of its bones and its vessels for offerings, says a communication from C. Leonard Woolley, director of the joint expedition of the British Museum and the University of Pennsylvania Museum. In the coffin, however, were left more than 150 little lumps of baked clay. In each fragment of clay is the impression of a seal.

The clay impression, Mr. Woolley explains, were taken from a great variety of gems, some beautifully cut. The gem seals were wrought in a style of art which prevailed during the great Persian Empire, founded by Darius in the fifth century B. C. The picture on one of the gems represents the king strangling a lion.

Welcoming the unexpected discovery of so much Persian art, the archaeologists are nevertheless at a loss to explain why the clay impressions of so many jewels were made, or why they came to be buried in a grave at Ur.

Finding the coffin beneath the house might add to the mystery, if the burial were a modern one. But in ancient Ur, burying the dead under the floor of a house was a common practice.

Science News Letter, May 14, 1932

BIOCHEMISTRY

Many Female Sex Hormones May Have the Same Source

THE question whether there are many different female sex hormones, or whether there is one mother-substance giving rise to all of the recently-discovered female sex hormones, was raised as a result of reports to the Federation of American Societies for Experimental Biology, Drs. J. B. Collip, J. S. L. Browne and D. L. Thomson of McGill University, Montreal, described the hormone which they have obtained in pure crystalline form.

This hormone, called emmenin, they have obtained from human placental material and also from the kidney secretions of expectant mothers. It appears to be very similar in gross chemical structure to the hormone, theelin, already reported by Dr. E. A. Doisy and associates of St. Louis University; to trihydroxyoestrin, another female sex hormone reported by Dr. Marrian of University College, London, and by Dr. Butenandt in Germany; and to a female sex hormone reported by Dr. Doehrn of Berlin. But while these substances appear to be the same chemically, they differ somewhat in the effect they have on the animal body.

Dr. Collip and his associates reported that when their emmenin is tested on baby female rats, its potency is from ten to twenty times as great as when it is tested on the usual test animal, a castrated female rat. He raised the question whether the method of testing these hormones is responsible for the different effects they are reported to produce on the body. He also asked whether one of these very hormones which are already known might not be the mother-substance, the real female sex hormone itself.

The hormone extracted by the McGill University investigators has been used to treat cases of female disorders with generally good results. It has been successful in nearly three-fourths of selected cases. Dr. Collip emphasized the fact that it should only be used in certain selected cases. For instance, it would not be suitable for disorders due to cancer or cysts.

Science News Letter, May 14, 1932

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ZOOLOGY

Pronghorn Antelope Played At Being Hunted by Dogs

A PRONGHORN antelope doe that induced dogs to pursue her, apparently for the fun of being chased and getting away from them, was the strange pet formerly owned by L. T. Murray of Mertzon, Texas. A description of her play at being hunted has been reported to the American Society of Mammalogists through the medium of its official journal.

Brought up by hand, the little pronghorn had no companions of her own kind. She used to go out on the main street of Mertzon and entice the dogs to pursue her. Being able to outrun any of them easily, she made the game all her own, fleeing in pretended terror, pausing to encourage the dogs to take up the chase again, and finally going home when she had tired of the sport.

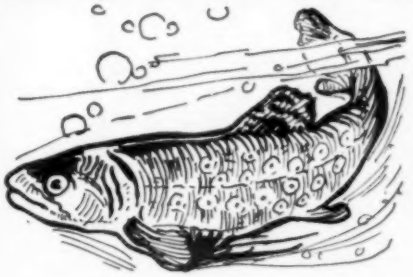
Her owner finally sent her to a park where there were other pronghorns, and she eventually became the mother of twin offspring.

Scientists have raised the question whether other animals, that in the wild are normally possible victims of predators, carry on this play of being hunted, as hunting animals, such as falcons and members of the cat family, often play at pursuing imaginary prey.

Science News Letter, May 14, 1932

ICHTHYOLOGY

NATURE RAMBLINGS *by Frank Thone*



Trout

WHIRRRRRRRR! The reel sings out, the rod's tip bends, a silver flash, another, another; the battle is on, trout versus angler; and may the better wit and the greater alertness—by no means certainly the angler's—win the day.

Probably nine-tenths or more of Izaak Walton's numerous progeny would rather "go a-angling" for trout than for any other fish. The swiftness and hardfighting gameness of the trout, the wild, beautiful scenery of its favorite haunts, the sleek beauty of any one of its many species, the very good eating it provides when (and if) caught, all help to make it the very king of freshwater fishes.

The various species of trout, homebiding fellows for all their adventurous disposition, have wandering brothers in the salmon. The salmon most sought after as game fish, indeed, are placed by naturalists in the same genus with trout, and even give it their own scientific name, *Salmo*. The big salmon of the commercial fisheries are also rated as close relatives, but ranked in a separate genus.

But even though it does dwell permanently in fresh water, the trout can on occasion do some vigorous traveling on his own account. The Yellowstone trout used to be a good deal of a puzzle, because it was found in the headwaters of the Snake River, which drains to the Pacific, and also in Yellowstone Lake, on the Atlantic side of the divide. But the divide between the lake and the upper rills of the river is in places a flat wet meadow, and here in rainy seasons trout have actually been seen working their way over "the top of the world", through shallow pools.

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PSYCHIATRY-VITAL STATISTICS

First Research Shows Human Defectives Meet Early Death

THOSE unfortunate babies who come into the world with badly defective brains usually die young. This is shown in the first extensive study ever made dealing with life curves of mental defectives.

Dr. Neil A. Dayton, director of research in the Massachusetts State Department of Mental Diseases, has completed the investigation. Dr. Dayton studied the cases of almost 9,000 mental defectives, including records of 878 deaths.

From death rates among these defectives, he figures that out of 1,000 idiot baby boys born, at ten years only 276 will be living. In the general population 803 baby boys out of 1,000 survive this age. At 20 years of age, 211 of the idiots will still be alive, still with their pathetic baby minds capable of understanding no more than a normal three-year-old child. At 30 years of age, 124 of the original thousand will be living; at 40 years 93; and by 60 years only 23.

Imbecile baby boys, with minds capable of developing as far as a seven-year-old child's, have a somewhat stronger hold on life than the idiots. Among 1,000 male imbeciles born, 314 will be alive at the end of ten years, while morons, who reach a mental level of seven to twelve years, have a still better chance of surviving. Out of 1,000 male morons born, there will be 705 survivors at the end of ten years.

Chances of survival among female defectives differ somewhat from the figures regarding males. Girl babies born defective have a slighter chance of surviving the first twenty years of life than have the males. But the death rate after twenty years favors the females.

Science News Letter, May 14, 1932

RADIO

The Science Service radio address next week will be on the subject of

THE WISDOM OF LIVING THINGS

Dr. Edwin G. Conklin

professor of zoology at Princeton University and prominent cytologist, will be the speaker.

FRIDAY, MAY 20

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• Booklists of the A. A. A. S.

Following is a continuation of the booklists of the American Association for the Advancement of Science, compiled by Joseph L. Wheeler, chairman of the Association's booklist committee. Previous installments of this list have appeared in the SCIENCE NEWS LETTER for March 12, April 2 and April 23; the last will be printed in the next issue. The lists as printed here have been changed slightly from their original form to include important new publications. The full set of twenty-seven annotated lists can be obtained by sending thirty cents in stamps to the American Association for the Advancement of Science, Smithsonian Institution, Washington, D. C.

Earth and Its Wonders

(*Continued*)

Daly, R. A. Our mobile earth 342p. 1926 Scribner $5.00.

Hobbs, W. H. Earth features and their meaning 517p. 2d ed. rev. & enl. 1931 Macmillan $4.50.

Ries, H. Elementary economic geology 360p. 1930 Wiley $3.75.

Tyrrell, G. W. Volcanoes 252p. 1931 Home Univ. Library, Holt $1.25.

Geological Travels

Powell, J. W. First through the Grand Canyon 320p. 1916 Macmillan $2.00.

Forrester, G. C. The falls of Niagara 155p. 1928 Van Nostrand $2.50.

Griggs, R. F. The Valley of Ten Thousand Smokes 341p. 1922 National Geog. Society $3.00.

Willis, Bailey. Living Africa; a geologist's wanderings in the Rift Valleys 320p. 1930 McGraw-Hill $4.00.

Mineralogy

Loomis, F. B. Field book of common rocks and minerals 276p. 1923 Putnam $3.50.

Whitlock, H. P. The history of the minerals 144p. 1925 Amer. Museum of Natural History $0.75.

Physical Geography

Tarr, R. S. and von Engeln, O. D. New physical geography 689p. 1927 Macmillan $2.40.

Salisbury, R. D. Physiography 679p. 3d ed. rev. 1929 Holt $4.00.

Feneman, N. M. Physiography of Western United States 534p. 1931 McGraw-Hill $5.00.

Texts

Bradley, J. H. The earth and its history 414p. 1928 Ginn $2.60.

Schuchert, Charles and Le Vene, C. M. The earth and its rhythms 410p. 1927 Appleton $4.00.

Texts-Advanced

The new Pirsson and Schuchert titles noted below are considerably condensed from their old form; these new briefer "Outlines" may also be had in a single volume; "Foundations of Geology," by Pirsson, Schuchert and Longwell, 1931, Wiley—$5.00.

Chamberlin, T. C. and Salisbury, R. D. College textbook of geology; rewritten and revised by R. T. Chamberlin and Paul MacClintock 2v. in 1. rev. and rewritten 1927-30 Holt $5.50 Also published in two separate volumes: v.1 Geological processes 377p. $3.00 v.2 Historical geology 539p. $3.75.

Pirsson, L. V. and Longwell, C. R. Outlines of physical geology 376p. 1930 Wiley $3.00.

Schuchert, Charles Outlines of historical geology 207p. 2d ed. 1930 Wiley $3.00.

Lahee, F. H. Field geology 789p. 3d etd. 1931 McGraw-Hill $5.00.

Modern Physics

General Works

Darrow, F. L. The new world of physical discovery 371p. 1930 Bobbs-Merrill $3.50.

Heyl, P. R. The fundamental concepts of physics in the light of modern discovery 112p. 1926 Williams & Wilkins $2.00.

Eddington, Sir A. S. The nature of the physical world 361p. 1928 Macmillan $3.75.

Darwin, C. C. The new conceptions of matter 224p. 1931 Macmillan $3.00.

Bragg, Sir W. H. Concerning the nature of things 249p. 1925 Harper $3.00.

Andrade, E. N. da C. What is the atom? 78p. 1927 Harper o. p. $1.00.

Clifford, J. L. Experiments in atomic science for the amateur 119p. 1930 Badger $1.50.

Wendt, Gerald and Smith, O. F. Matter and energy v.1 335p. 1931 Blakiston $1.50.

Electricity and Radiation

Gibson, C. R. Modern conceptions of electricity 283p. 1928 Lippincott $5.00.

Slack, E. P. Elementary electricity 278p. 1931 McGraw-Hill $2.00.

Millikan, R. A. The electron 293p. 2d. ed. 1924 Univ. of Chicago Press $2.50

Kaye, G. W. G. The practical applications of X-ray 128p. 1923 Dutton $3.75.

Soddy, Frederick The interpretation of radium 256 p. 4th ed. rev. & enl. 1922 Putnam o. p. $3.75.

Light and Color

Luckiesh, Matthew Color and its applications 367p. 1921 Van Nostrand $4.50.

Houston, R. A. Light and color 179p. 1923 Longmans $2.50.

Sound

Bragg, Sir W. H. The world of sound 203p. 1920 Dutton $2.00.

Miller, D. C. The science of musical sounds 268p. 2d. ed. 1922 Macmillan $2.50.

Wood, Alexander Sound waves and their uses 152p. 1930 Blackie English price 7sh. 6d.

Relativity

It would be gratifying but difficult to include several satisfactory popular works on this important subject; there is no satisfactory general book for the ordinary reader. Some of the general books like Darrow and Heyl include chapters on relativity that are easily understood.

Physics of the Home

Osborn, F. A. Physics of the home; a textbook for students of home economics 400p. 2d. ed. 1929 McGraw-Hill $3.00.

History and Biography

Hart, I. B. The great physicists 137p. 1928 Methuen $.85.

Heyl, P. R. New frontiers of physics 170p. 1930 Appleton $2.00.

Crew, Henry The rise of modern physics. 356p. 1928 Williams & Wilkins $5.00.

History of Science Society Sir Isaac Newton 351p. 1928 Williams & Wilkins $5.00.

Textbooks

Black, N. H. and Davis, H. N. New practical physics; fundamental principles and applications to daily life 645p. 1929 Macmillan $1.64.

Science News Letter will secure for its subscribers any book or magazine published in the United States. Send check or money order to cover regular retail price ($5 if price is unknown, change to be remitted) and we will pay postage in the U. S. Address: Library, Science Service, 21st and Constitution Avenue, Washington, D. C.